INTERNATIONAL PRELIMINARY EXAMINATION REPORT
International application No. PCT/EP 03/03107

I. Basis of the report

1. With respect to the **components** of the international application (*Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Regulations 70.16 and 70.17)):*

   The description, pages:

1-7	in the originally filed version

   The claims, Nos.:

2-9	received on 03/06/2004 with letter of 03/05/2004
1	filed at the interview on 06/14/2004

   The drawings, sheets/fig.:

1/2 - 2/2	in the originally filed version

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Yes: Claims 1-9 No: Claims
Inventive Step (IS)	Yes: Claims 1-9 No: Claims
Industrial Applicability (IA)	Yes: Claims 1-9 No: Claims

2. CITATIONS AND EXPLANATIONS
   see supplementary page

EV323022753

Reference is made to the follow document:

D1: XP 000617549, "A PROCEDURE TO ESTIMATE THE ABSOLUTE POSITION OF THE ROTOR FLUX OF A PERMANENT MAGNET SYNCHRONOUS MACHINE", EUROPEAN CONFERENCE ON POWER ELECTRONICS & APPLICATIONS, 1991, BACKHAUS; REINOLD; KALKER

Subject
The patent application relates to a method for determining the rotor position of a synchronous motor

Distinguishing technical features
Document D1 is regarded as the best related art. It describes a method for determining the rotor position of a synchronous motor, a plurality of current vectors being applied to the synchronous motor in different directions, and in so doing, the amount of the current vector necessary for attaining a defined deflection of the rotor being determined. The rotor position is calculated from at least one angular position of the current vector, for which the amount of the current vector necessary for attaining the defined deflection of the rotor is minimal.

The patent application contains two independent claims which differ from the related art due to the following features:
- the motor is held
- the rotor returns to its original position after the current vector is switched off.

Therefore, Claims 1-9 are novel.

Set Objective
The rotor position can be determined without uncontrolled movements by the features of Claims 1 and 9.
Therefore, Claims 1-9 are inventive.

What Is Claimed Is:

1. A method for determining the rotor position of a synchronous motor (2), comprising the following steps:

- applying a plurality of current vectors (I) to the synchronous motor (2) in different directions, in so doing, determining the amount of the current vector (I) necessary for attaining a defined deflection of the rotor (R), the deflection of the rotor (R) yielding a restoring torque, proportional to the deflection, by which the rotor (R) returns to its original position after the application of each current vector (I);

- calculating the rotor position from at least one angular position of the current vector (I), for which the amount of the current vector (I) necessary for attaining the defined deflection of the rotor (R) is minimal.

2. The method as recited in Claim 1, wherein a position-measuring instrument (3) is used for measuring the deflection of the rotor (R).

3. The method as recited in Claim 1 or 2, wherein the defined deflection of the rotor (R) is less than 0.01° for rotary synchronous motors (2) or less than 0.1 mm for linear synchronous motors (2).

4. The method as recited in one of the preceding claims, wherein the plurality of current vectors (I) is distributed uniformly over one electrical period.

5. The method as recited in Claim 4, wherein the plurality of current vectors (I) is distributed in steps of less than 10°.

6. The method as recited in one of the preceding claims, wherein the rotor position is calculated as the half of the sum of two adjacent angular positions of the current vectors (I), for which the amount of the current vector (I) necessary for attaining the defined deflection of the rotor (R) is minimal.

7. The method as recited in one of the preceding claims, wherein the direction of the defined deflection of the rotor (R) is taken into account in such a way that the rotor position is unequivocally determined.

8. The method as recited in one of the preceding claims, wherein as a first step, a brake (5) holding the rotor (R) of the synchronous motor (2) is engaged.

9. A control for a synchronous motor (2), set up for implementing a method as recited in one of Claims 1-8.